

DOCUMENT-IDENTIFIER: US 5657141 A

TITLE: Liquid crystal device

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BSPR:

This invention relates to a liquid crystal device to be used in a liquid crystal display device or a liquid crystal-optical shutter, etc., particularly a liquid crystal device using of a ferroelectric liquid crystal, and a liquid crystal display apparatus using the liquid crystal device.

BSPR:

More specifically, there has been disclosed a display apparatus including a display panel comprising scanning electrodes and data electrodes arranged in a matrix, whole-area writing means for selecting all or a prescribed part of the scanning electrodes for writing and partial writing means for selecting a part of the above-mentioned all or a prescribed part of the scanning electrodes. As a result, a partial motion picture display can be performed at a high speed by the partial writing mode, and the partial writing and the whole-area writing can be performed compatibly.

BSPR:

An object of the present invention is to provide a liquid crystal device having a good shock resistance particularly at low temperature and a liquid crystal display apparatus using the liquid crystal device.

BSPR:

Another object of the present invention is to provide a liquid crystal device having an excellent low temperature storage properties and a liquid crystal display apparatus using the liquid crystal device.

BSPR:

According to the present invention, there is further provided a liquid crystal display apparatus comprising the above liquid crystal device, a drive circuit for driving the liquid crystal device and a light source.

DRPR:

FIG. 6 is a block diagram of a liquid crystal display apparatus and a graphic controller.

DRPR:

FIG. 7 is a time chart showing time correlation for image data communication between the liquid crystal display apparatus and the graphic controller.

DEPR:

A liquid crystal display apparatus may be constituted by using the liquid crystal device for a display panel and by adopting an arrangement and data format comprising image data accompanied with scanning line address data and also a communication synchronization scheme using a SYNC signal as shown in FIGS. 6 and 7.

DEPR:

Referring to FIG. 6, the liquid crystal display apparatus 101 includes a graphic controller 102, a display panel 103, a scanning line drive circuit 104, a data line drive circuit 105, a decoder 106, a scanning signal generator 107, a shift resistor 108, a line memory 109, a data signal generator 110, a drive control circuit 111, a graphic central processing unit (GCPU) 112, a host central processing unit (host CPU) 113, and an image data storage memory (VRAM) 114.

DEPR:

Image data are generated in the graphic controller 102 in an apparatus body and transferred to the display panel 103 (illuminated with a backlight (not shown)) by signal transfer means shown in FIGS. 6 and 7. The graphic controller 102 principally comprises a CPU (or GCPU, central processing unit) 112 and a VRAM (video-RAM, image data storage memory) 114 and is in charge of management and communication of image data between a host CPU 113 and the liquid crystal display apparatus (FLCD) 101. The control of image display according to the present invention is principally accomplished by the graphic controller 102. Incidentally, a light source is disposed at the back of the display panel 103.

DEPR:

Each of the liquid crystal compositions A-H and the ferroelectric liquid crystals (ZLI-3233 and CS-1014) was cooled to 30.degree. C. providing chiral smectic C phase through phases including cholesteric phase and smectic A phase or smectic A phase.

DETL:

TABLE 3

Ps

.theta. Liquid T.sub.PT (.degree.C.) (nC/cm.sup.2) (degrees) Crystal Cry
Sc* S.sub.A Ch Iso (30.degree. C.) (30.degree. C.)

##STR46## ##STR47## ##STR48## ##STR49## 5.8 14.5 B ##STR50##
##STR51##
##STR52## ##STR53## 5.8 14.9 C ##STR54## ##STR55## ##STR56##
##STR57##
6.1 16.0 D ##STR58## ##STR59## ##STR60## ##STR61## 6.1 14.9 E
##STR62##
##STR63## ##STR64## ##STR65## 7.5 15.5 F ##STR66## ##STR67##
##STR68##
##STR69## 3.4 14.1 G ##STR70## ##STR71## ##STR72## ##STR73## 5.6 14.3
H
##STR74## ##STR75## ##STR76## ##STR77## 5.8 15.7 ZLI-3233 ##STR78##
##STR79## ##STR80## ##STR81## 9.9 29.0 CS-1014 ##STR82## ##STR83##
##STR84## ##STR85## 4.7 21.0

Cry:

Crystal or higherorder smectic phase Sc*: Chiral smectic C phase S.sub.A :

Smectic A phase Ch: Cholesteric phase Iso: Isotropic phase